

CLAIMS

1. A control system of an internal combustion engine having a valve mechanism able to change a valve opening characteristic of at least one of an intake valve and exhaust valve and burning an air-fuel mixture comprised of fuel and air inside a combustion chamber to generate power, characterized by being provided with  
5 a cylinder pressure detecting means for detecting a cylinder pressure at said combustion chamber and  
10 an intake air calculating means for calculating an amount of air sucked into said combustion chamber based on an intake air pressure during valve overlap between said intake valve and said exhaust valve, an exhaust gas pressure during valve overlap, a cylinder  
15 pressure during the compression stroke detected by said cylinder pressure detecting means, and a gas passage effective area during said valve overlap.
2. A control system of an internal combustion engine as set forth in claim 1, wherein the exhaust gas pressure during valve overlap is estimated based on the cylinder pressure detected by the cylinder pressure  
20 detecting means before or at the start of valve overlap.
3. A control system of an internal combustion engine as set forth in claim 2, wherein the exhaust gas pressure during valve overlap is also estimated based on a load of the internal combustion engine.  
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4. A control system of an internal combustion engine as set forth in claim 3, wherein when the load of said internal combustion engine is higher than a  
30 predetermined load, the exhaust gas pressure during valve overlap is estimated higher than the cylinder pressure detected by the cylinder pressure detecting means before or at the start of valve overlap.
5. A control system of an internal combustion engine as set forth in any one of claims 1 to 4, wherein said internal combustion engine has a plurality of said  
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combustion chambers and is provided with said cylinder pressure detecting means for each combustion chamber and the intake air pressure during the valve overlap in any combustion chamber is estimated based on the cylinder pressure at intake bottom dead center of another combustion chamber where the intake stroke was executed before that combustion chamber.

6. A control system of an internal combustion engine as set forth in any one of claims 1 to 5, wherein the system is further provided with a second intake air calculating means for calculating the amount of air sucked into said combustion chamber by a different technique from said intake air calculating means forming the first intake air calculating means and calculates the amount of air sucked into said combustion chamber used for control of said internal combustion engine based on the amount of air sucked into said combustion chamber calculated by said first intake air calculating means and the amount of air sucked into said combustion chamber calculated by said second intake air calculating means.

7. A control system of an internal combustion engine as set forth in claim 6, wherein the amount of air sucked into said combustion chamber in the current cycle calculated by said second intake air calculating means is corrected based on the amount of air sucked into said combustion chamber in the previous cycle calculated by said first intake air calculating means so as to calculate the amount of air sucked into said combustion chamber in the current cycle.

8. A control system of an internal combustion engine as set forth in claim 7, wherein the amount of air sucked into said combustion chamber in the current cycle calculated by said second intake air calculating means is corrected based on the difference between the amount of air sucked into said combustion chamber in the previous cycle calculated by said first intake air calculating means and the amount of air sucked into said combustion

chamber in the previous cycle calculated by said second intake air calculating means so as to calculate the amount of air sucked into said combustion chamber in the current cycle.

5           9. A control system of an internal combustion engine as set forth in claim 8 wherein, when the difference between the amount of air sucked into said combustion chamber in the previous cycle calculated by said first intake air calculating means and the amount of  
10 air sucked into said combustion chamber in the previous cycle calculated by said second intake air calculating means is a predetermined value or more, correcting the amount of air sucked into said combustion chamber in the current cycle calculated by said second intake air  
15 calculating means based on said difference so as to calculate the amount of air sucked into said combustion chamber in the current cycle, is prohibited.

          10. A control system of an internal combustion engine as set forth in claim 1, wherein said gas passage effective area is calculated based on lift amounts of the  
20 intake valve and exhaust valve during said valve overlap and the engine speed during said valve overlap.

          11. A control method of an internal combustion engine having a valve mechanism able to change a valve opening characteristic of at least one of an intake valve  
25 and exhaust valve and burning an air-fuel mixture comprised of fuel and air inside a combustion chamber to generate power, characterized by

                  calculating the amount of air sucked into  
30 the combustion chamber based on an intake air pressure during valve overlap between said intake valve and said exhaust valve, an exhaust gas pressure during valve overlap, a cylinder pressure at said combustion chamber during a compression stroke of said internal combustion  
35 engine, and a gas passage effective area during said valve overlap.